

Walnut Street Railroad Bridge
Walnut Street over AMTRAK
Hartford
Hartford County
Connecticut

HAER No. CT-49

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
MID-ATLANTIC REGION, NATIONAL PARK SERVICE
DEPARTMENT OF THE INTERIOR
PHILADELPHIA, PENNSYLVANIA 19106

HISTORIC AMERICAN ENGINEERING RECORD

WALNUT STREET RAILROAD BRIDGE HAER No. CT-49

Location: Walnut Street over AMTRAK
Hartford
Hartford County, Connecticut

UTM: 18.692740.4626870
Quad: Hartford North, Connecticut,
1:24000

Date of Construction: 1907

Engineer: New York, New Haven & Hartford
Railroad

Fabricator: Boston Bridge Works, Inc.

Present Owner: State of Connecticut
Department of Transportation
24 Wolcott Hill Road
Wethersfield, Connecticut 06109

Present Use: Vehicular bridge

Significance: This bridge is significant as a
representative example of standard
20th-century truss construction; as
a product of Boston Bridge Works, a
regionally important bridge fabrica-
tor; and as part of the New Haven
Railroad's extensive improvements in
the early 20th century.

Project Information: This documentation was undertaken
in June 1991 pursuant to the State
Historic Preservation Officer's
review of a federally funded project
by the state Department of
Transportation to widen Walnut St.
from two lanes to four, including
removal of the bridge. The Federal
Highway Administration and the
Advisory Council on Historic
Preservation agreed to mitigate the
adverse effect through documenta-
tion.

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Description of Bridge and Setting

The Walnut Street bridge across the railroad right-of-way in Hartford, Connecticut, is a 120'-long steel double-intersection Warren through truss built in 1907. The 24'-wide roadway accommodates two traffic lanes. Vertical clearance at the portals is 17' 11". Plate-girder outriggers support sidewalks along both sides of the bridge.

The railroad right-of-way is four tracks wide and runs at the prevailing grade of the surrounding area; to either side of the bridge, embankments (also built in 1907) raise Walnut Street to the height of the crossing, which provides 24' of vertical clearance for rail traffic. Manufacturing and warehouse use predominates in the surrounding area, including multi-story brick structures located close to the southeast and northwest corners of this bridge. The right-of-way was owned by the New York, New Haven & Hartford Railroad, commonly called the New Haven Railroad, until that company's final demise in the 1960s. Presently, the right-of-way is owned and operated by the National Railroad Passenger Corporation (AMTRAK); these tracks also accommodate freight service provided by the Consolidated Rail Corporation (CONRAIL).

The bridge's Warren truss pattern features hip verticals and sub-verticals from each intersection of diagonals and from the inclined end posts, making a total of ten panels. The truss is made up of the following members:

Upper chord and inclined end posts: box girder, 16" x 19", formed from angles with an interior plate on each side, cover plate on top, and lacing on the bottom.

Lower chord: box girder, 16" x 16", formed from channels with bottom lacing.

Diagonals: end and center diagonals consist of two angles with lacing; others are formed from four angles that formerly had laced webs but now have a center plate with oval cutouts. The

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cutout plates are connected with high-strength bolts, and similar fasteners have also replaced the original rivets on those diagonals that retain lacing. In addition, new feet have been bolted to the bottoms of all the diagonals.

Verticals: lattice girders, consisting of four angles with lacing in the web between the angles.

Portal strut: a lattice of angles approximately 8' deep, with curved-plate sway braces.

Top bracing: lattice-girder struts, about 3' deep; full diagonal lateral bracing formed from single angles; and lattice-girder longitudinal bracing down the center of the bridge.

All original connections are riveted, using large gusset plates.

The floor system consists of heavy plate-girder floor beams and five rolled I-beam stringers. The floor beams have been increased in depth with an additional I-section running along their original top flanges; the stringers are attached to these added pieces. The original plank deck has been replaced a deck of pre-cast concrete sections. Sidewalks (concrete) on both sides of the bridge are carried on triangular-shaped plate-girder brackets attached to the bottom chords and the panel-point gusset plates. The north sidewalk was raised (in 1964) by means of squat concrete piers to accommodate a water pipe running beneath it.

The roadway is protected on the south side only by a metal-mesh fence attached to the truss. Similar mesh fencing serves as sidewalk railings. On the northeast end post is a builder's plate reading "BUILT BY THE/BOSTON BRIDGE/WORKS INC./1907".

The abutments are both of reinforced-concrete construction and approximately 5' in section. Similarly constructed wingwalls angle back obliquely from the ends of both abutments. The northwest wingwall is truncated in length, apparently because of

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the building located immediately adjacent to the bridge. The southeast wingwall features a sidewalk along its top, providing a passage between the railroad grade and the street; the steel pipe rail for the sidewalk is original to the bridge.

The overall appearance of the bridge is relatively unchanged from its original construction. The concrete deck and sidewalks (including the raising of the north walk) were installed in 1964. The structural rehabilitation of the diagonals -- new web plates, replacing rivets with high-strength bolts, and splicing on new feet -- also occurred at that time.

Historical Context

Walnut Street Railroad Bridge was built at a time of tremendous expansion by the New York, New Haven, & Hartford Railroad. Formed in 1872 as a consolidation of two smaller companies with their origins in the 1830s, the New Haven Railroad controlled most of the trackage in Connecticut. In the last quarter of the 19th century, the New Haven bought, leased, or merged with nearly every other railroad in southern New England. Its routes included not only the original New Haven-Hartford line but also the New England Railroad Company (formerly the New York and New England, and before that the Hartford, Providence and Fishkill), which was the principal east-west line through Hartford.

Since New England was one of the most industrialized areas in the country and one of the most densely populated, the New Haven Railroad benefited from high levels of both freight and passenger traffic, and it became one of the largest carriers in the United States. It was estimated that nearly one of every ten passengers in the country was carried by the New Haven Railroad. In the 1890s and early 1900s, the railroad completely rebuilt its major lines, doubling its right-of-way to four tracks around the major cities such as Hartford and New Haven. In the first decade of the 20th century, the railroad also built a new classification yard in Hartford, about one-quarter

mile north of Walnut Street (Hartford Union Station, the passenger terminal, stood about one-quarter mile south of Walnut Street). These developments substantially increased the rail traffic at the Walnut Street grade crossing. Every train traveling north or east of Hartford had to cross Walnut Street. Moreover, many of the Hartford factories along this densely industrialized corridor had rail sidings that originated or received freight cars from the main yard north of Walnut Street.

The rising frequency of trains combined with the increasingly busy street traffic to make Walnut Street the most dangerous grade crossing in the city. Though never popular, such crossings were the focus of renewed antipathy in the early 20th century. After two fatalities at Walnut Street in 1906, the city engineer assigned the highest priority to the "urgent necessity of the abolition of the grade crossing" (Hartford Municipal Register, 1907, p. 223). The following year, the railroad responded by constructing this overpass.

Technological Significance

In its design, material, and method of connection, Walnut Street Railroad Bridge typifies the standard bridge engineering which had evolved by the early 20th century. The bridge uses the Warren configuration which, along with the Pratt truss, had become almost universal, replacing the myriad of patented trusses that had characterized the 19th century. Similarly, its material, steel, had superseded wrought iron, and the use of riveted connections had replaced the pinned method in all but the largest of trusses.

The bridge is unusually rugged for a highway bridge of this size and period. The large size of the members, the use of subverticals to divide the panels, and the double-web system all derive from its origin in a railroad engineering department. Railroads were accustomed to designing for much higher loads than highway engineers, and they favored multiple-web

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designs because of their greater rigidity. Rigidity was important in railroad bridges because a relatively slight deflection could result in derailment.

This bridge was over-designed not simply from habit but also because of the absolute need to protect the right-of-way from accidents. Because two major passenger lines, as well as virtually every freight car to and from Hartford, passed under the bridge, any accident would shut down the city's entire rail system.

The Bridge's Fabricator

Boston Bridge Works was a prominent bridge manufacturer, at one time dominating the New England market for large railroad and highway trusses. The firm was founded in 1876 by D.H. Andrews, formerly an engineer with another Boston fabricator, National Bridge and Iron Works. For the next 55 years, the company had a thriving business building bridges, steel-framed buildings, and large specialized structures such as dock cranes and railroad turntables. The company fell on hard times in the Depression, finally going out of business in 1938. Among notable surviving Boston Bridge Works structures are the 1885 Albion Bridge, Cumberland, Rhode Island; the 1892 Harvard Bridge in Boston; the 1905 Connecticut River railroad bridge, Woodsville, New Hampshire; and the 1926 Point Street Swing Bridge, Providence, Rhode Island. Only one other highway bridge by the firm is known to exist in Connecticut.

BIBLIOGRAPHY

- Connecticut Department of Transportation. Inventory of Historic Bridges. Historic Resource Consultants, Inc., 1990.
- Darnell, Victor. Directory of American Bridge-Building Companies. Washington: Society for Industrial Archeology, 1984.
- Galer, Gregory J. "The Boston Bridge Works and the Evolution of Truss Building Technology," Honors thesis, Brown University, 1989; available at the John Hay Library, Providence.
- Hartford, City of. Hartford Municipal Register, 1907. Hartford, 1907.
- Stannard, R. Patrick. Lines of the New York, New Haven, and Hartford Railroad Company. Priv. pr., 1976.